U.S. Department of Energy
and the
National Science Foundation

U.S. LHC Joint Oversight Group

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Subject: Charge for the March 2005 Review of the Software and Computing (S&C) Plans for the U.S. LHC Research Program

The Joint Oversight Group (JOG) for the U.S. Large Hadron Collider (LHC) Program of the Department of Energy and the National Science Foundation (DOE/NSF) greatly appreciates your willingness to participate in a review of the Software and Computing (S&C) plans for the U.S. LHC Research Program, which will take place at Brookhaven National Laboratory on March 1-4, 2005.

The review is intended to evaluate the progress and plans of the U.S. ATLAS and U.S. CMS S&C activities in order to assess the effectiveness of the management structures, and to learn whether the S&C activities are sufficiently strong and focused to facilitate research by U.S. collaborators at the LHC. The review will focus on the scope, cost, and schedule of the S&C plans for the period leading up to LHC turn-on, and scrutinize the needs of U.S. ATLAS and CMS for the initial period of LHC running. To this end, the collaborations will provide sufficient financial information to evaluate the following funding scenarios for U.S. LHC participation in Software and Computing for the period FY2005-FY2009, with emphasis on FY2007 and beyond:

- Minimal: The U.S. maintains most of its prior commitments and provides a minimum level of service that does not place U.S. collaborators at a disadvantage.
- Leadership: The U.S. plays a substantive role in selected areas, and is able to influence major decisions related to the architecture and deployment of hardware and software components. This implies an active development program in S&C, with the goal of addressing any future upgrades of the LHC machine and the associated ATLAS and CMS detectors.
- Reduced: Discuss the impact and priorities for the U.S. S&C effort in FY2007 assuming a 10% reduction in funding relative to current FY2007 guidelines.

The review will also consider the appropriateness of the U.S. S&C scopes, and how well tasks taken up by the U.S. are conceived, executed, and monitored. Is risk evaluated in a reasonable manner, and is scope well-matched to funding guidance? The review will also examine the adequacy of communication among the U.S. collaborations, their international counterparts and other relevant entities such as the LCG and EGEE.

The collaborations are expected to present an analysis of the critical paths for their major S&C milestones, including the impact of any deferments or de-scoping in the international program. In particular, the review should attempt to assess whether the U.S. collaborations are minimizing the possibility of a disproportionately harmful effect on the U.S. program from the possibility of any unmet international milestones.

As a guide, we point to the following issues:

MANAGEMENT AND EXTERNAL INTERACTIONS

- The overall scope of the U.S. S&C efforts and their connections to the international S&C efforts and the LCG project.
- The "portfolio balance" of U.S. involvement – does it give U.S. researchers a realistic chance for effective participation in LHC science?
- The risk of international S&C manpower shortfalls affecting U.S. milestones – are the U.S. collaborations taking appropriate steps to minimize this risk?
- Is the level of U.S. participation in S&C issues commensurate with the overall participation in the LHC program?
- Flexibility in Management: Does management have a well-conceived algorithm (including management reserve) to react and adapt to budgetary uncertainties? Do the organizational structures provide enough flexibility?
- Is the methodology of determining the funding split between M&O and S&C well conceived? Does it optimize the returns on U.S. investment in the LHC?
- Is there sufficient coordination with the international managers of the two LHC collaborations, and is U.S. management effective in communicating its unique needs and perspectives? Is there sufficient communication between US-ATLAS and US-CMS?

FACILITIES, GRIDS, AND PHYSICS-ANALYSIS MODELS

- The function and scope of the national U.S. LHC computing facilities (Tier-1 centers), their relationship to CERN (Tier-0 center) and to the regional facilities (Tier-2 centers), and whether present plans (hardware, Grid software, and networking) are adequate for satisfying the needs as outlined in the experiments' documentation of computing models. Are there additional facilities accessible to U.S. LHC that could be leveraged?
- The effectiveness of the physics-analysis models and whether they take into account the unique U.S. perspective and interactions with the whole international collaboration. What are the plans (if any) for regional analysis centers?
- Do the results of the latest round of data and service challenges lend support to the computing models proposed by U.S. scientists? Are U.S. scientists ("users") providing sufficient feedback on problems specific to U.S. involvement?

CORE SOFTWARE

- Has the personnel shortage in the international efforts improved since the previous comprehensive review of 2004, and is the U.S. carrying a fair burden of the effort in core software, including leadership responsibilities?

- Are the U.S. collaborations sufficiently vigilant in controlling "scope creep"? Is there a well-defined strategy for defining the scope of U.S. participation and for the transition from development to production software?
- How does the progress in core software stack up against the milestones shown at the previous comprehensive review? Are U.S. milestones on track and realistic? Is there any critical dependence on international milestones that brings substantial risk to U.S. deliverables?

The review will be chaired by the U.S. LHC Research Program Manager, Tom Ferbel. Jim Whitmore will serve as the NSF representative, and Saul Gonzalez as the Technical Coordinator and Secretary. You will receive all available documentation at least one week prior to the start of the review. We will appreciate closeout statements following the reviews of both ATLAS and CMS, and more formal written reports within one month of the completion of your evaluation. This will provide valuable input to the Agencies and to the experiments prior to the meeting of the Resource Review Boards in the Spring of 2005 at CERN. Your reports will also be made available to other DOE/NSF committees that review the U.S. ATLAS and U.S. CMS projects.

Again, we wish to express our great appreciation for your willingness to participate in this important activity.

Sincerely,

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